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## CERTIFICATION

I, Stephen M. Lins, maintaining my place of business at the address shown above, herewith certify that the accompanying English text is a true and correct translation of the corresponding German language document:

### ***Offenlegungsschrift DE 30 17 371 A1***

I additionally attest that I have knowledge of both the German and English languages, and that I am further qualified by education, experience and vocation to issue this certification. I affirm under the penalty of perjury under the laws of the United States that the foregoing is correct to the best of my information and belief.



Stephen M. Lins

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Application for examination has been entered according to §44 of the Patent Law.

(54) TIGHTENING RATCHET FOR LASHING STRAPS

DE 30 17 371 A1

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PLEASE SPECIFY OUR REFERENCE:  
1 / 13 (80179)  
NUREMBERG, 6 MAY 1980

3017371

SpanSet Inter AG, Basel, Switzerland

Claims:

- 1.) Tightening ratchet with a slotted shaft rotatably supported on a tightening frame for tightening of a loose strap and with a tightening lever rotatably supported on the slotted shaft:
  1. The slotted shaft is fixedly connected to the ratchet wheel of a ratchet lock.
  2. Supported on the tightening lever is a pawl (tightening slide), which
    - 2.1 engages the toothing of the ratchet wheel under spring pressure and
    - 2.2 blocks the rotational movability of the tightening lever relative to the slotted shaft in the tightening direction.
  3. Supported on the tightening frame is a pawl (holding slide), which
    - 3.1 engages the toothing of the ratchet wheel under spring pressure and
    - 3.2 blocks the rotational movability of the slotted shaft relative to the tightening frame in the direction opposite to the tightening direction.
  4. Arranged on the tightening frame is a first bridge that is parallel to the slotted shaft.
  5. The lay-on side of the tightening frame runs approximately parallel to the tangent that runs through the first bridge and touches the peripheral side of the slotted shaft facing away from the tightening lever.

Characteristics:

6. The tightening frame (1) connecting the slotted shaft (2) and the first bridge (13) to each other is extended beyond the slotted shaft (2).
7. At the end of the extension arm (17) a bridge (18) running parallel to the slotted shaft (2) can be attached.
8. The first bridge (13) is provided with a guide slot (22).

2.) Tightening ratchet according to claim 1, characterized in that the first bridge (13) is removably attached to the tightening frame (1).

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ORIGINAL INSPECTED

- 3.) Tightening ratchet according to claim 1 or 2, characterized in that the distance (23) of the strap guiding slot (22) from the lay-on side (14) of the tightening frame (1) is approximately equal to the distance of the second bridge (18) from the lay-on side (14) of the tightening frame (1).
- 4.) Tightening ratchet according to one or several of the preceding claims, characterized in that at least one of the bridges (13, 18) is formed as a bolt with a slot passing through in the direction of its longitudinal axis.
- 5.) Tightening ratchet according to one or several of the preceding claims, characterized in that at least one of the bridges (13, 18) is removably attached to the tightening frame (1), especially fastened by screw.
- 6.) Tightening ratchet according to one or several of the preceding claims, characterized in that at least the bridge (13) provided with a strap guiding slot (22) is attachable to the tightening frame (22) so as to be rotatable around a spindle that is parallel to the slotted shaft (2).

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Tightening Ratchet for Lashing Straps

The invention relates to a tightening ratchet with the features of the preamble of claim 1.

In a known tightening ratchet of the type stated above, the first bridge serves exclusively the connection of the tightening ratchet to a belt band or to the fixed end of the lashing strap to be tightened. In order to turn the slotted shaft and to tighten the belt or the loose end of the lashing strap pulled through the slot of the slotted shaft, the tightening lever is always swung in one direction, namely in the direction away from the first bridge. The fact that the actuation direction of the tightening lever is only possible towards one side can be disadvantageous in certain application cases of the tightening ratchet.

The invention, in contrast, is based on the task of developing a tightening ratchet, of the type stated at the beginning, in such a way that its slotted shaft, according to the manner of its installation, is rotated during the swinging of the tightening lever either in the direction toward the fastened strap end – in the following called “fixed strap” for short – or in the direction away from the fixed strap, in order to tighten the strap pulled through by the slotted shaft – which strap is called the “loose strap” in the following. This task is achieved through the characterizing portion of claim 1.

To be able to use the tightening ratchet in such a way that, through the swinging of the tightening lever, the slotted shaft of the ratchet is turned or tightened in a direction towards the fixed strap, requires merely that an additional bridge be attached for installation into the fixed strap at the end of the extension arm, and that the first bridge be provided with a strap guide slot. The loose strap is guided through the strap guide slot before it is pulled through the slot of the slotted shaft. If now the tightening lever is swung in the direction of the fixed strap and thereby the slotted shaft is rotated in the tightening direction, then the slot guide ensures that the loose

strap, or rather, the loose end of the lashing strap is aligned in the intake region in the tightening frame in a manner approximately parallel to the lay-on side of the tightening frame or in approximately a straight line with the longitudinal course of the end of the fixed strap. In addition, the slot guide prevents, during the swinging of the tightening lever in this installation position, the rotation of the tightening frame together with the tightening lever. Thus, through the strap guiding slot, the strap-guiding end of the tightening frame is, to a certain degree, fixed at the tightened region of the loose strap or the loose end of the lashing strap.

Through the characterizing portion of claim 2, a first, conventional bridge can be easily replaced with such a bridge having a guide slot.

Through the characterizing portion of claim 3, it is ensured that the fixed strap and the loose strap in their adjoining region at the tightening ratchet run approximately on a straight line that is itself aligned approximately parallel to the lay-on side of the tightening frame, whereby the tightening frame rests with its lay-on side fully or flat on the goods to be lashed and is not tilted with respect to the surface of the lashed goods during the lashing, which tilting could cause damage to the surface region of the lashed goods.

In the embodiment according to claim 4, the slot guide and the bridge are formed in such a way that they can be used, according to choice, for forced guiding of the loose strap or for insertion into the fixed strap. If the tightening ratchet is to be installed in the fixed strap for operation in the conventional course of movement, then indeed no bridge at all need be attached to the end of the extension arm. If, however, an installation for a reversed course of movement, according to the invention, is desired in the tightening of the lashing strap, this requires in addition only that an additional bridge or bolt be attached at the end of the extension arm, which bridge or bolt now serves for insertion into the fixed end of the lashing strap, while the first, slotted bridge serves for guiding the tightened end of the loose strap.

Through the characterizing portion of claim 6, the rotational position of the bridge and/or slot guide can automatically adjust to the tightening direction of the fixed and/or loose strap.

An embodiment example of the inventive object is explained in detail with the aid of the figures. In the drawings:

Fig. 1 shows a perspective view of a tightening ratchet of conventional design, by the aid of which the basic functioning of a tightening ratchet is explained,

Fig. 2 shows a side view of a tightening ratchet formed according to the invention, viewed in the direction of arrow II in Fig. 1 in the tightened position of the fixed strap and loose strap,

Fig. 3 shows a side view similar to Fig. 2 wherein the tightening frame of the tightening ratchet, in order to reverse the movement course during the tightening of the slotted shaft, is inserted into the end of the fixed strap by the end of the extension arm,

Fig. 4 shows a schematic representation of the guiding of the loose strap in the installation of the tightening ratchet according to Fig. 3, and

Fig. 5 shows a side view of the tightening ratchet according to the invention in a swung-up position of the tightening lever, wherein the blocking of the rotational movability of the slotted shaft relative to the tightening frame is canceled by force.

The tightening ratchet represented in Fig. 1 consists in essence of the tightening frame 1, the slotted shaft 2 rotatably supported at the front end of the tightening frame 1 for tightening the loose end 3 of the lashing strap or of the loose strap 3, and the tightening lever 4 rotatably supported on the slotted shaft 2. The slotted shaft 2 is fixedly connected at both ends in each case to a ratchet wheel 5 of a ratchet lock. Supported on the tightening lever 4 is a first pawl, which in the following is called the "tightening slide 6" for short. The tightening slide 6, under the pressure of the spring 7 supported on the tightening lever 4, engages with its prong-like ends 9 the toothing 8 of the ratchet wheel 5 and blocks the rotational movability of the tightening lever 4 in relation to the slotted shaft 2 in the tightening direction 12.

On the tightening frame 1, a second pawl – in the following called the "holding slide 10" for short – is supported so as to be displaceable in the direction of the toothing 8 of the ratchet wheel 5. The holding slide 10 is under the pressure of the spring 11 supported on the tightening frame 1, which spring presses the holding slide against the toothing 8 of the ratchet wheel 5. Upon the falling of the holding slide 10 into the toothing 8 of the ratchet wheel 5, the rotational movability of the slotted shaft 2 in relation to the tightening frame 1 is blocked in the tightening direction 12 of the tightening lever 4.

Arranged on the rearward end of the tightening frame 1 is a first bridge 13, which runs parallel to the slotted shaft 2. The lay-on side 14 of the tightening frame 1 runs approximately parallel to the tangent 16 that runs through the first bridge 13 and touches the peripheral side 15, facing away from the tightening lever 4, of the slotted shaft 2.

The tightening frame 1 connecting the slotted shaft 2 and the first bridge 13 to each other is extended beyond the slotted shaft 2. Attachable at the end of the extension arm 17 is a bridge 18 likewise running parallel to the slotted shaft 2, for which corresponding bores 19 are placed in the side pieces 20 of the tightening frame 1. The first bridge 13 is provided with a guide slot 22 for the loose end of the lashing strap or the loose strap 3.

The first bridge 13 is removably attached to the tightening frame 1, which can be made possible through a screw connection. The distance of the guide slot 22 of the first bridge 13 from the lay-on side 14 of the tightening frame 1 is approximately equal to the distance of the bridge 18 attached to the extension arm 17 from the lay-on side 14 of the tightening frame 1. These distances are labeled as 23 in Fig. 3.

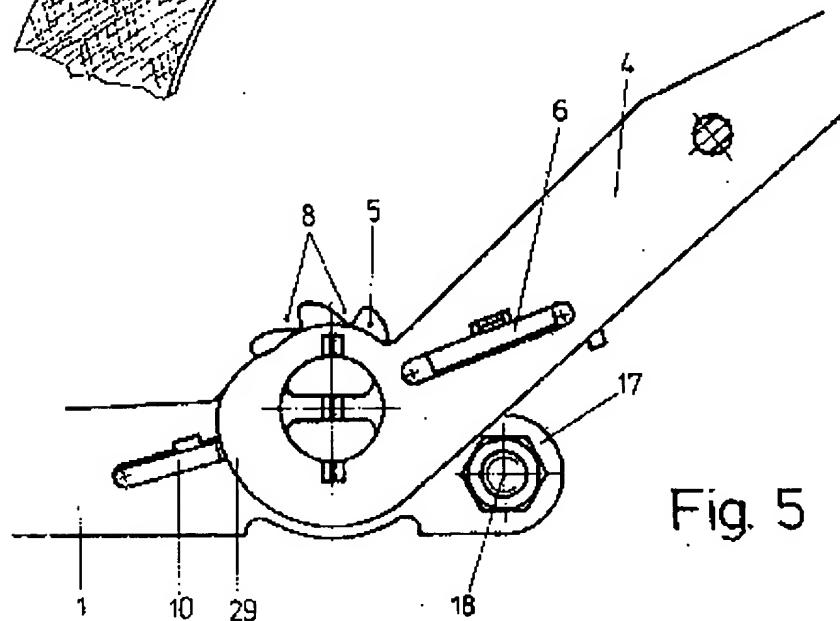
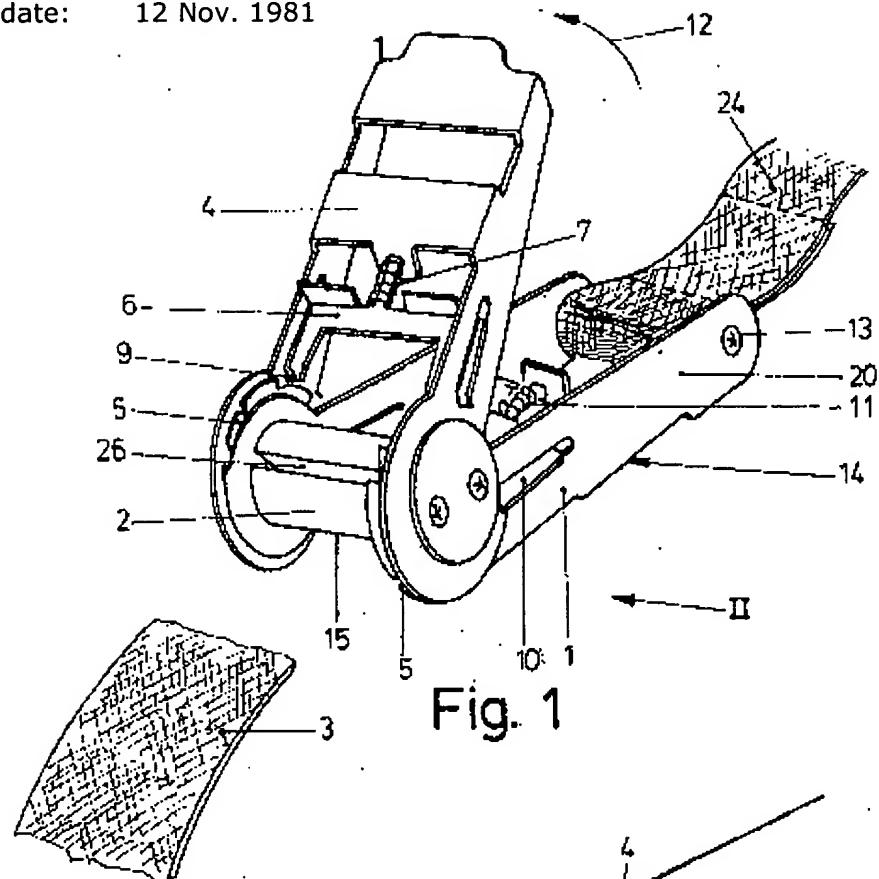
According to choice, both bridges 13, 18 can also be formed as bolts with slots passing through in the direction of the longitudinal axis. At least the first bridge 13 forming the guide slot can be supported so as to be rotatable in relation to the tightening frame around an axis that is parallel to the slotted shaft.

For conventional operation of the ratchet, the tightening frame 1 is inserted with the first bridge 13 into the fixed end of the lashing strap or into the fixed strap 24. In this case, the extension arm 17 and its bores 19 have no function. In order to lash tight the loose strap 3, the latter is pulled through the guide slot 22 of the slotted shaft 2 with the loose strap end 21 until a certain pre-tensioning, easily applicable by hand, is present on the goods to be lashed. Then the tightening lever 4 is swung back and forth multiple times in the tightening direction 12, i.e. away from the fixed strap 24, in a swinging range of approximately  $120^\circ$ . Thereby, the slotted shaft 2 is rotated. The loose strap 3 is tightened, the loose strap end being clamped firmly between the loose strap 3 and the slotted shaft 2 and thus not slipping out.

In the installation of the tightening ratchet according to Figs. 3 and 4, the tightening frame 1 is inserted with the bridge 18 provided on the extension arm 17 into the end of the fixed strap 24. The first bridge 13 displays a guide slot 22. The end 21 of the loose strap 3 is first pulled through the guide slot 22 (Fig. 4), before it is pulled through the shaft slot 26 of the slotted shaft 2. In order to tighten the slotted shaft 2 or rather the loose strap 3, the tightening lever 4 is swung back and forth in the alternative tightening direction 27 (Fig. 3), as this was described in detail in reference to Fig. 2. The alternative tightening direction 27 is towards the fixed strap 24. During this, the guide slot 22 of the first bridge 13 holds the loose strap 3 in a straight line with the alignment of the fixed strap 24, even though the loose strap 3 winds up on the peripheral side 28 of the slotted shaft 2 facing away from this straight line.

Fig. 5 shows the conventional manner of loosening the tightening ratchet located in the tightening position. For this, the tightening slide 6 is merely pulled out of its engagement with the toothing of the ratchet wheel 5 and the tightening lever 4 is swung through until the control cam 29 provided on its bearing periphery also pushes the holding slide 10 out of its engagement position in the toothing 8 of the ratchet wheel 5. Under the tension of the loose strap 3, the slotted shaft 2 then rotates far enough that the loose strap end 21 can be easily pulled out of the shaft slot 26.

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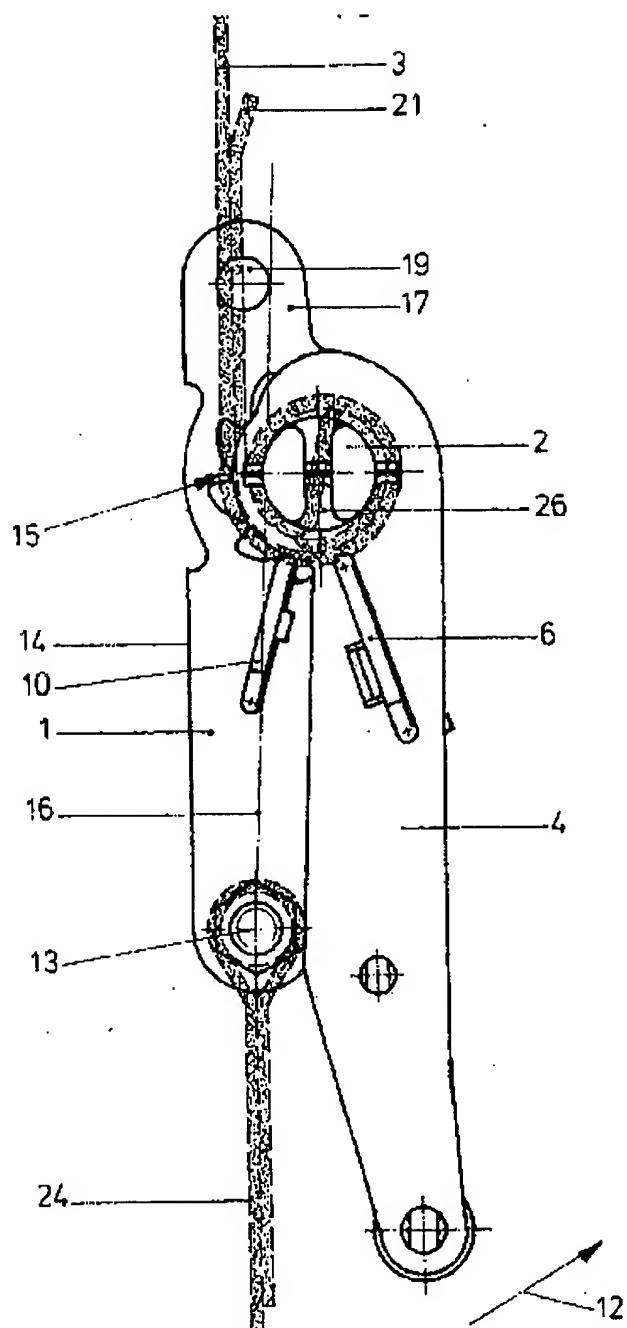


Fig. 2

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Fig. 3

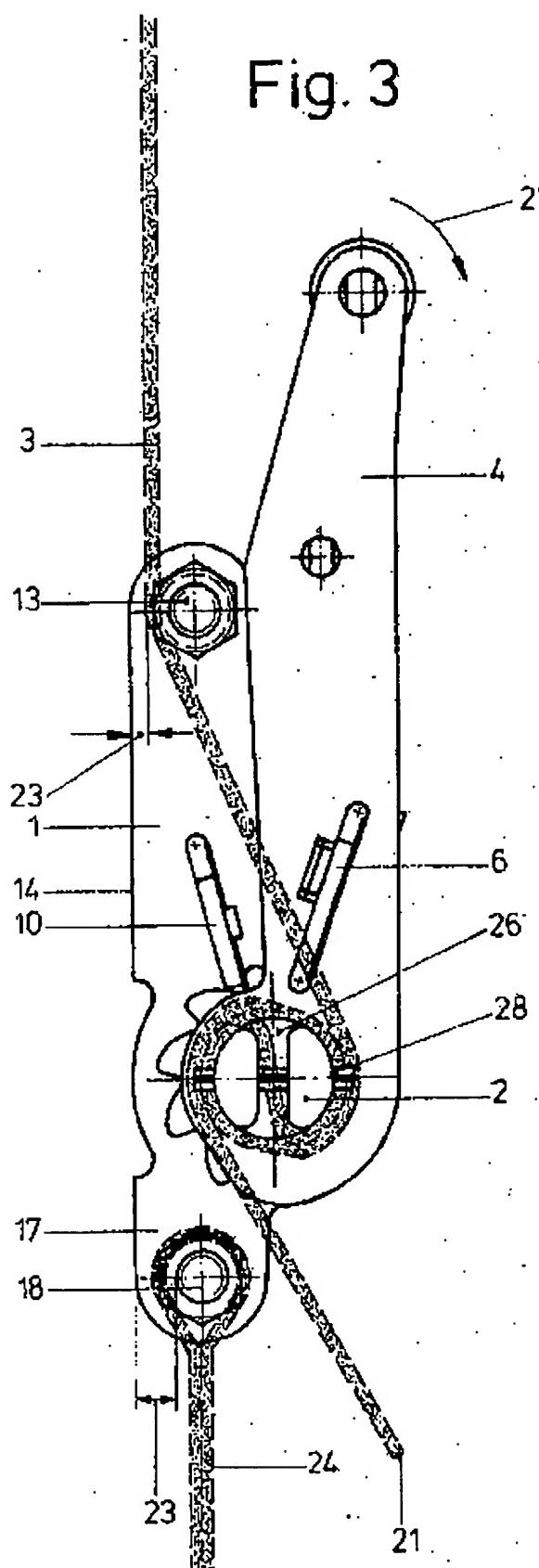
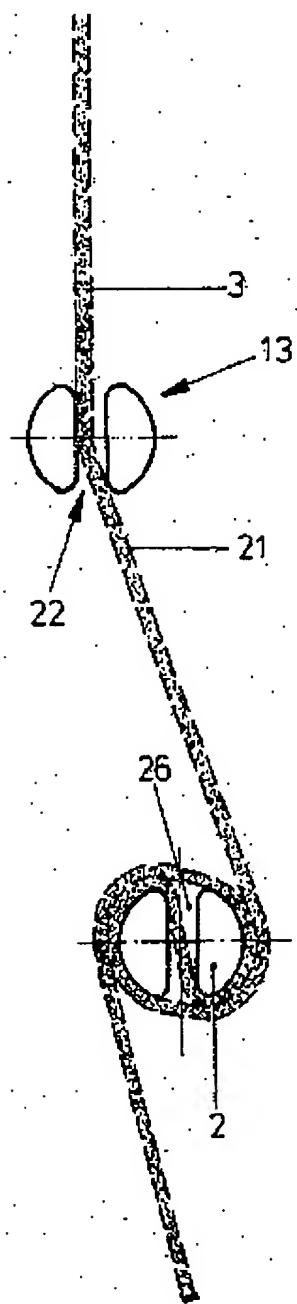


Fig. 4



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